

# PATENT ABSTRACTS OF JAPAN

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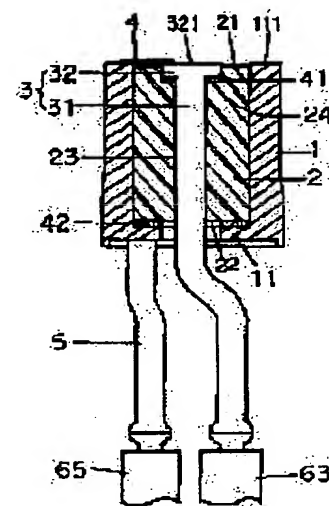
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## ) IGNITING PART FOR ELECTRIC DETONATOR

### )Abstract:

**PROBLEM TO BE SOLVED:** To provide an igniting part for an electric detonator, capable of preventing accidental explosion due to electrostatic induction or the damage of electric bridge wires due to loading pressure of igniting charge surely, and further, capable of being manufactured easily.  
**SOLUTION:** The bottom surface of a spot facing 24 of an insulating body 2 made of ceramics is connected to the rear surface of inflated head 32 of a lead pin 3 through a connecting material and a gap between them is sealed while the inwardly projected flange 11 of a metallic tube 1 is connected to the other end surface 22 of the insulating body 2 made of ceramics through connecting material and a gap between them is sealed respectively. A gap between the other end surface 111 of the metallic tube 1 and the flat end surface 21 of the insulating body 2 made of ceramics as well as a step between the flat end surface 21 of the insulating body 2 and the surface 1 of inflated head of the lead pin 3 are specified so as to be not more than 100μm or preferably not more than 50μm.



## LEGAL STATUS

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## AIMS

aim(s)]

aim 1] It is equipped in the metal cylinder which has inboard \*\*\*\*\* in the end section inner circumference of a  
 under part, and the above-mentioned metal cylinder. The insulator made from the ceramics with which the end face  
 ich attends the other end side of this metal cylinder is made into a flat side, a lead pin insertion hole is installed  
 ging from this end face to an other end side, and it comes to prepare the spot facing section in insertion opening of  
 insertion hole, The lead pin which has the pin section inserted in the above-mentioned lead pin insertion hole, and  
 bulge head held in the above-mentioned spot facing section, It has the bridge line connected between the other end  
 face of the above-mentioned metal cylinder, and the bulge head front face of a lead pin. The ignition components  
 electric detonators to which between the spot facing section base of the above-mentioned insulator made from the  
 amics and the bulge head rear faces of a lead pin and between the above-mentioned inboard \*\*\*\*\* of a metal  
 under and the other end sides of the insulator made from the ceramics are characterized by junction and carrying out  
 seal with a jointing material for corrugated fibreboard, respectively.

aim 2] It is equipped in the metal cylinder which has inboard \*\*\*\*\* in the one end section inner circumference of a  
 under part, and the above-mentioned metal cylinder. The insulator made from the ceramics with which the end face  
 ich attends the one end side of this metal cylinder is made into a flat side, the step which engaged with the above-  
 mentioned inboard \*\*\*\*\* of a metal cylinder is prepared in the perimeter of this flat end face, and it comes to install a  
 l pin insertion hole ranging from this end face to an other end side, The lead pin which has the pin section inserted in  
 above-mentioned lead pin insertion hole, and the flange stopped in the other end side of the above-mentioned  
 alator made from the ceramics, It has the bridge line connected between the end face by the side of metal cylinder  
 end, and the tip end face of a lead pin. The ignition components for electric detonators to which between the flange  
 he above-mentioned lead pin and the other end sides of the insulator made from the ceramics and between the above-  
 mentioned inboard \*\*\*\*\* of a metal cylinder and the above-mentioned steps of the insulator made from the ceramics  
 characterized by junction and carrying out the seal with a jointing material for corrugated fibreboard, respectively.

aim 3] The ignition component for electric detonators according to claim 1 or 2 the level difference between the flat  
 l face of the insulator made from the ceramics and a lead pin end face and whose level difference between the flat  
 l face of the insulator made from the ceramics and a metal cylinder end face are 100 micrometers or less.

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## TAILED DESCRIPTION

### ailed Description of the Invention]

01]

ld of the Invention] This invention relates to the ignition components of an electric detonator.

02]

scription of the Prior Art] The electric detonator used for blasting operations, crushing of a concrete building, the air for automobiles, etc. is the configuration which filled up the metal outer case with ignition medicine in contact with bridge line while blockading opening of a metal outer case with the ignition components which have a bridge line, in ignition, is made to light ignition medicine by energization generation of heat of a bridge line, and is bursting the metal outer case. If the configuration of this electric detonator and a service condition are caused how, the potential difference arises between a lead pin and a metal outer case for electrostatic induction, and discharge arises between a lead pin and metal outer case, consequently the potential difference occurs according to electrostatic imbalance among bridge line ends, and there is [ which a current flows on a bridge line for this potential difference, and comes to be discharged identically ] awe.

03] Conventionally, as an electric detonator, as shown in drawing 4 , insulating glass 2' is installed through metal container liner 1' for the point of 1st lead pin 3' as a sealing agent. said -- a container liner -- one -- ' -- the -- two -- a -- a pin -- five -- ' -- welding -- the -- one -- a lead -- a pin -- three -- ' -- an apical surface -- a container liner -- one -- an apical surface -- between -- a bridge -- a line -- four -- ' -- connecting -- becoming -- ignition -- components -- A -- a metal -- a container liner -- one -- ' -- a metal -- an outer case -- b -- -ed -- a crown -- carrying out -- while -- a tal -- an outer case -- b -- inside -- ignition -- medicine -- c -- having been filled up -- a thing -- well-known -- Since ween the metal outer case b, lead pin 3', and 5' is electrically connected with the metal container liner 1' list by bridge : 4' etc. by low resistance, the accidental discharge resulting from the above-mentioned electrostatic induction can be ninated, and it is advantageous.

04]

blem(s) to be Solved by the Invention] In the closure of metal container liner 1' by above-mentioned insulating glass the glass block which has a lead pin insertion hole is dedicated in a metal container liner, the point of the 1st lead pin inserted in the lead pin insertion hole, melting and coagulation of a glass block are done with heating, and the surface of a metal container liner and a lead pin, and glass is pasted up. However, with this configuration, since it is d to make the apical surface of a metal container liner, the apical surface of closure glass, and the 1st lead pin apical face flat-tapped and a bridge line is pressurized by the field of the non-flush with the filling pressure of an ignition nt, we are anxious about damage on a bridge line. Conventionally, in order to make the above-mentioned field flat-ped, grinding with a grinding stone is proposed (JP,6-185897,A). However, since a degree of hardness is greatly ferent with a lead pin metallurgy group container liner and insulating glass and the polish rates to each part material fer, it is not easy to process the above-mentioned field flat-tapped by polish.

05] The purpose of this invention can prevent certainly the accidental discharge resulting from the above-mentioned trostatic induction, and damage on the bridge line by the filling pressure of ignition medicine, and is to offer the ition components for electric detonators which can moreover be manufactured easily.

06]

eans for Solving the Problem] The metal cylinder by which the ignition components for electric detonators of 1 icerning this invention have inboard \*\*\*\*\* in the end section inner circumference of a cylinder part, The insulator de from the ceramics with which it is equipped in the above-mentioned metal cylinder, the end face which attends the er end side of this metal cylinder is made into a flat side, a lead pin insertion hole is installed ranging from this end e to an other end side, and it comes to prepare the spot facing section in insertion opening of this insertion hole, The

pin which has the pin section inserted in the above-mentioned lead pin insertion hole, and the bulge head held in above-mentioned spot facing section, It has the bridge line connected between the other end end face of the above-mentioned metal cylinder, and the bulge head front face of a lead pin. It is the configuration by which between the spot facing section base of the above-mentioned insulator made from the ceramics and the bulge head rear faces of a lead pin and the above-mentioned inboard \*\*\*\*\* of a metal cylinder, the other end side of the insulator made from the ceramics and between are characterized by junction and carrying out the seal with a jointing material for corrugated fibreboard, respectively. \*\* to which a level difference exists between the flat end face of the level difference between the other end end face of a metal cylinder and the flat end face of the insulator made from the ceramics and the insulator from the ceramics and the bulge head front face of a lead pin, and 100 micrometers or less of its level difference preferably set to 50 micrometers or less.

[07] The metal cylinder by which other ignition components for electric detonators concerning this invention have inboard \*\*\*\*\* in the one end section inner circumference of a cylinder part, It is equipped in the above-mentioned metal cylinder, and the end face which attends the one end side of this metal cylinder is made into a flat side. The insulator made from the ceramics with which the step which engaged with the above-mentioned inboard \*\*\*\*\* of a metal cylinder is prepared in the perimeter of this flat end face, and it comes to install a lead pin insertion hole ranging in this end face to an other end side, The lead pin which has the pin section inserted in the above-mentioned lead pin insertion hole, and the flange stopped in the other end side of the above-mentioned insulator made from the ceramics, It has the bridge line connected between the end face by the side of metal cylinder one end, and the tip end face of a lead pin. It is the configuration by which between the flange of the above-mentioned lead pin and the other end sides of the insulator made from the ceramics and between the above-mentioned inboard \*\*\*\*\* of a metal cylinder and the above-mentioned steps of the insulator made from the ceramics are characterized by junction and carrying out the seal with a jointing material for corrugated fibreboard, respectively. \*\* to which a level difference exists between the level difference between the above-mentioned inboard protrusion \*\*\*\*\* of a metal cylinder and the flat end face of the insulator made from the ceramics, and the flat end face of the insulator made from the ceramics and the tip end face of a lead pin, and 100 micrometers or less of its level difference are preferably set to 50 micrometers or less.

[08] [Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained, referring to a drawing. Drawing 1 is the explanatory view showing an example of the ignition components for electric detonators of 1 concerning this invention. In drawing 1, 1 is a metal container liner and has inboard \*\*\*\*\* 11 in the end section inner circumference of a cylinder part. 2 is an insulator made from the ceramics, the one end side 21 is made into a flat side, a lead pin insertion hole 23 is installed ranging from this one end side 21 to the other end side 22, and the spot facing section 24 is formed in insertion opening of this insertion hole 23. 3 is a lead pin which has the pin section 31 and the bulge head 32. In this lead pin 3, the pin section 31 is inserted in the lead pin insertion hole 23 of the insulator 2 made from the ceramics, the bulge head 32 is dedicated to the spot facing section 24, and between that bulge head rear face and spot facing base is carried out by the jointing material for corrugated fibreboard 41, for example, a low melting point metal membrane, junction and a seal. Moreover, in the insulator 2 made from the ceramics, it is dedicated in the metal container liner 1, and between the inside of inboard \*\*\*\*\* 11 of this container liner 1 and the other end sides 22 of the insulator 2 made from the ceramics is carried out by the jointing material for corrugated fibreboard 42, for example, a low melting point metal membrane, junction and a seal. Although a level difference exists between the level difference between the one end side 21 of this insulator 2 made from the ceramics, and the one end side 111 of the metal container liner 1 and the one end side 21 of the insulator 2 made from the ceramics, and the external surface 321 of the lead pin bulge head 32, 100 micrometers or less of that level difference are preferably set to 50 micrometers or less.

[09] 4 is the bridge line connected by welding etc. between the one end side 111 of the metal container liner 1, and external surface 321 of the lead pin bulge head 32. 5 is the return circuit side lead pin welded to the other end side of metal container liner 1. Alloyed wires, such as simple substance metal wires, such as the iron whose wire size is usually 20-50 micrometers, nickel, molybdenum, platinum, a tungsten, and a tantalum, a nickel-chromium system, and iron-chromium-aluminum system, are used for the above-mentioned bridge line 4. Copper, iron, stainless steel, etc. are used for the above-mentioned metal container liner 1 or the lead pin 3.

[10] In the above to junction and the seal of the insulator 2 made from the ceramics, and the metal container liner 1, a junction and the seal of the lead pin bulge head 32 and the insulator 2 made from the ceramics For example, the interlayer who combined with the ceramics firmly at the other end side and the spot facing section of the insulator made from the ceramics (For example, the ulmin acid manganese layer by the Mo-Mn method) is formed, galvanize metals, such as copper with easy soldering, and tin, sheet-like solder is made to intervene on this interlayer at a junction surface, and how a heat pressure welding performs both junction and a seal at once can be used. When ceramics is

nina ceramics, an interlayer cannot be formed but it can also join directly with a heat pressure welding with sheet-like aluminum system solder. In this case, the depth of the metal container liner 1, the height of the insulator 2 made from the ceramics, the depth of the spot facing section 24 of the insulator 2 made from the ceramics, the tolerance on processing of the thickness of the bulge head 32 of the lead pin 3 etc. and a metal container liner, a lead pin, and the insulator made from the ceramics -- further Although it originates in the thermal strain difference based on the difference of the coefficient of thermal expansion of solder and a level difference arises between the one end side 21 of insulator 2 made from the ceramics, and the one end side 111 of the metal container liner 1, and between the one end side 21 of the insulator 2 made from the ceramics, and the bulge head external surface 321 at the tip of a lead pin. Considering the coefficient of thermal expansion of the usual processing tolerance or each above-mentioned ingredient, it is easy to dedicate preferably less than 100 micrometers of this level difference to less than 50 micrometers.

11] In the above-mentioned example, although the return circuit side lead pin 5 was welded to the metal container liner 1 and insulated wire 63 and 65 is connected to each lead pins 3 and 5, as shown in drawing 2, about a return circuit side, insulated wire 65 is also directly connectable with the metal container liner 1.

12] Drawing 3 is the explanatory view showing an example of other ignition components for electric detonators concerning this invention. In drawing 3, 1 is a metal container liner and has inboard \*\*\*\*\* 110 in the one end section or circumference of a cylinder part. 2 is an insulator made from the ceramics, the one end side 21 is made into a flat side, a step 240 is formed in the perimeter of this one end side 21, and the lead pin insertion hole 23 is installed ranging from this one end side 21 to the other end side 22. 3 is a lead pin which has the pin section 31 and a flange 33. Copper, silver, etc. are used for this lead pin 3 metallurgy group container liner 1 like the above. In this lead pin 3, the pin section 31 is inserted in the lead pin insertion hole 23 of the insulator 2 made from the ceramics, a flange 33 is contacted by the other end side 22 of the insulator 2 made from the ceramics, and that contact interface is carried out by the jointing material for corrugated fibreboard 42, for example, a low melting point metal membrane, junction and a seal. Moreover, the insulator 2 made from the ceramics, it is dedicated in the metal container liner 1, and between the inside of inboard \*\*\*\*\* 110 of this container liner 1 and the steps 240 of the insulator 2 made from the ceramics is carried out the jointing material for corrugated fibreboard 410, for example, a low melting point metal membrane, junction and a seal. Between the level difference between the one end flat side 21 of this insulator 2 made from the ceramics, and the other end side 111 of the metal container liner 1 and the one end flat side 21 of the insulator 2 made from the ceramics, and the apical surface 311 of the lead pin 3, \*\* in which a level difference exists, and 100 micrometers or less of its level difference are preferably set to 50 micrometers or less.

13] 4 is the bridge line connected by welding etc. between the one end side 111 of the metal container liner 1, and the apical surface 311 of the lead pin 3, and 5 for which alloyed wires, such as simple substance metal wires, such as the one whose wire size is usually 20-50 micrometers, nickel, molybdenum, platinum, a tungsten, and a tantalum, a nickel-iron system, and an iron-chromium-aluminum system, are used like the above is the return circuit side lead pin welded to the other end side of the metal container liner 1.

14] In junction and the seal of the step of the above-mentioned insulator made from the ceramics, and inboard \*\*\*\*\* of a metal container liner, and junction and the seal of the flange of a lead pin, and the other end side of the insulator made from the ceramics For example, an interlayer is formed in the insulator part made from the ceramics in a contact interface like the above-mentioned example. Galvanize a metal with easy soldering at this interlayer top, a contact interface is made to carry out sheet-like solder mediation, and how a heat pressure welding performs both contact and a seal at once with sheet-like aluminum system solder can be used, without preparing the approach and interlayer who perform both junction and a seal at once with a heat pressure welding. Also in this case, the thickness of inboard \*\*\*\*\* of a metal container liner, the height of the step of the insulator made from the ceramics, the tolerance on processing of the die length of the height of the insulator made from the ceramics, and the pin section of a lead pin and a metal container liner, a lead pin, and the insulator made from the ceramics -- further Although it originates in the thermal strain difference based on the difference of the coefficient of thermal expansion of solder and a level difference arises between the flat side of the insulator made from the ceramics, and the one end side of a metal container liner, and between the flat side of the insulator made from the ceramics, and the apical surface of a lead pin It is easy to the above to dedicate preferably less than 100 micrometers of this level difference to less than 50 micrometers.

15] The ignition components concerning this invention are used by being filled up with ignition medicine in a metal outer case while carrying out a crown-etch to opening of a metal outer case airtightly in the metal container liner of the ignition component concerned. In this case, since between a metal outer case and the lead pins 3 and 5 is electrically connected with metal container liner 1 list by bridge line 4 grade by low resistance, the accidental discharge resulting from electrostatic induction can be eliminated. Moreover, although pressurized with the filling pressure of ignition medicine in a bridge line The end face of the insulator made from the ceramics with which the pressure welding of the

bridge line is carried out is flat. The level difference of this flat side and the tip end face of a lead pin and the level difference of this flat side and a metal container liner one end side 100 micrometers or less, Since it is preferably made 100 micrometers or less (below a dimension almost equal to a bridge line outer diameter), it limits for bending a bridge line in a level difference part, and shear breakage can fully be prevented. Furthermore, since ignition medicine is tightly held by junction and the seal of the insulator made from the ceramics, and a metal container liner, and junction of the seal of a lead pin point and the insulator made from the ceramics to the exterior, it is damp in ignition medicine, \*\*\* is eliminated, and it can hold to stability by them. Therefore, it operates and the positive outstanding reliability can be guaranteed. The ignition components concerning this invention are the configurations that the level difference of the field where a bridge line touches can be held down to 50 micrometers or less preferably 100 micrometers or less, considering the usual processing tolerance of each part material, such as a metal container liner, an insulator made from the ceramics, and a lead pin, and are easy to manufacture.

[16]

Effect of the Invention] In the ignition components for electric detonators concerning this invention, on structure, even if it is the configuration which a level difference produces in the field where a bridge line touches, it is the configuration that 100 micrometers or less of the level difference can be stopped easily [ it is desirable and ] for 50 micrometers or less by the usual processing tolerance of a member. therefore, the manufacture which does not have the awe which a bridge line damages in the filling pressure of ignition medicine according to this invention -- the easy ignition components for electric detonators can be offered.

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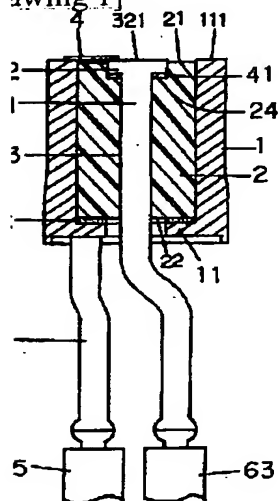
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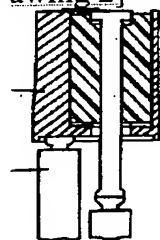
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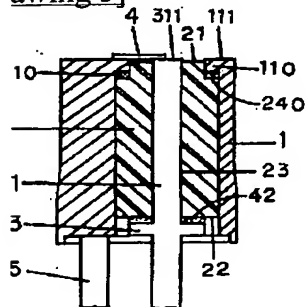
awing 1]



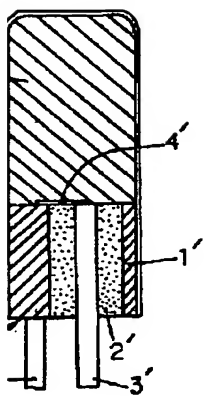
awing 2]



awing 3]



awing 4]



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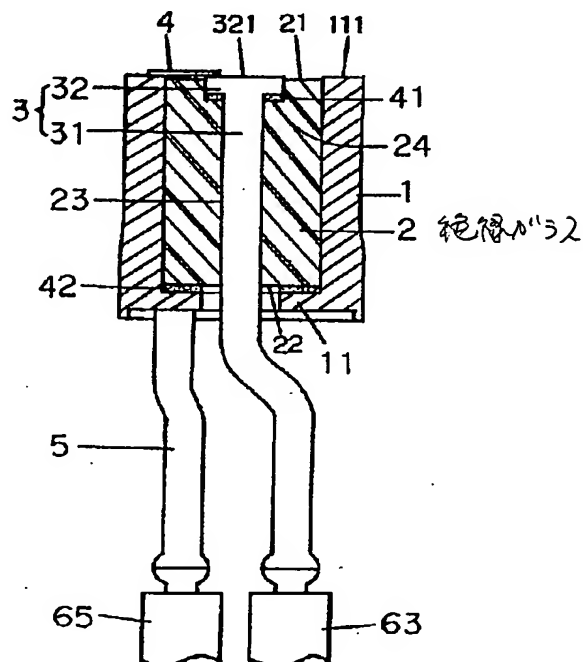
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(54) 【発明の名称】 電気雷管用点火部品

(57) 【要約】

【課題】 静電誘導に起因する暴発や着火薬の充填圧力による電橋線の損傷を確実に防止でき、しかも容易に製造できる電気雷管用点火部品を提供する。

【解決手段】 セラミックス製絶縁体2の座ぐり部24の底面とリードピン3の膨出頭部32の裏面との間及び金属筒1の内方向突出部11とセラミックス製絶縁体2の他端面22と間がそれぞれ接合材で接合・シールされ、金属筒1の他端面111とセラミックス製絶縁体2の平坦端面21との間の段差及びセラミックス製絶縁体2の平坦端面21とリードピン3の膨出頭部表面321との間の段差が100μm以下、好ましくは50μm以下とされている。



## 【特許請求の範囲】

【請求項1】筒部的一端部内周に内方向突出部を有する金属筒と、上記金属筒内に装着され、同金属筒の他端側に臨む端面が平坦面とされ、この端面から他端面にわたってリードピン挿通孔が貫設され、該挿通孔の挿入口に座ぐり部が設けられてなるセラミックス製絶縁体と、上記リードピン挿通孔に挿通されたピン部と上記座ぐり部に収容された膨出頭部とを有するリードピンと、上記金属筒の他端端面とリードピンの膨出頭部表面との間に接続された電橋線とを備え、上記セラミックス製絶縁体の座ぐり部底面とリードピンの膨出頭部裏面との間及び金属筒の上記内方向突出部とセラミックス製絶縁体の他端面との間がそれぞれ接合材で接合・シールされていることを特徴とする電気雷管用点火部品。

【請求項2】筒部の片端部内周に内方向突出部を有する金属筒と、上記金属筒内に装着され、同金属筒の片端側に臨む端面が平坦面とされ、この平坦端面の周囲には金属筒の上記内方向突出部に係合された段部が設けられ、同端面から他端面にわたってリードピン挿通孔が貫設されてなるセラミックス製絶縁体と、上記リードピン挿通孔に挿通されたピン部と上記セラミックス製絶縁体の他端面に係止された部とを有するリードピンと、金属筒片端側の端面とリードピンの先端端面との間に接続された電橋線とを備え、上記リードピンの部とセラミックス製絶縁体の他端面との間及び金属筒の上記内方向突出部とセラミックス製絶縁体の上記段部との間がそれぞれ接合材で接合・シールされていることを特徴とする電気雷管用点火部品。

【請求項3】セラミックス製絶縁体の平坦端面とリードピン端面との間の段差及びセラミックス製絶縁体の平坦端面と金属筒端面との間の段差が100 $\mu$ m以下である請求項1または2記載の電気雷管用点火部品。

## 【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は電気雷管の点火部品に関するものである。

【0002】

【従来の技術】爆破作業、コンクリート建造物の破碎、自動車用エアバック等に使用される電気雷管は、電橋線を有する点火部品で金属外筒の開口を閉塞すると共に金属外筒に着火薬を電橋線に接して充填した構成であり、作動においては、電橋線の通電発熱で着火薬を点火させて金属外筒を破裂させている。この電気雷管の構成や使用条件の如何によっては、静電誘導のためにリードピンと金属外筒との間に電位差が発生し、リードピンと金属外筒との間に放電が生じ、その結果、電橋線両端間に静電的アンバランスにより電位差が発生し、この電位差のために電橋線に電流が流れて暴発するに至る恐れがある。

【0003】従来、電気雷管として、図4に示すよう

に、金属内筒1'に第1リードピン3'の先端部を絶縁ガラス2'を封止材として貫設し、同内筒1'に第2リードピン5'を溶接し、第1リードピン3'の先端面と内筒1'の先端面との間に電橋線4'を接続してなる点火部品A'の金属内筒1'に金属外筒bを被冠すると共に金属外筒b内に着火薬cを充填したものが公知であり、金属外筒bとリードピン3'及び5'との間が金属内筒1'並びに電橋線4'等により電気的に低抵抗にて連結されているので、上記静電誘導に起因する暴発を排除でき有利である。

【0004】

【発明が解決しようとする課題】上記絶縁ガラス2'による金属内筒1'の封止においては、リードピン挿通孔を有するガラスブロックを金属内筒内に納め、そのリードピン挿通孔に第1リードピンの先端部を挿入し、加熱によりガラスブロックを溶融・凝固させて金属内筒及びリードピンとガラスとの界面を接着させている。しかしながら、かかる構成では、金属内筒の先端面と封止ガラスの先端面と第1リードピン先端面とを面一にし難く、電橋線がその非面一の面に着火剤の充填圧力で加圧されるので、電橋線の損傷が懸念される。従来、上記の面を面一にするために、砥石で研磨することが提案されている（特開平6-185897号公報）。しかしながら、リードピンや金属内筒と絶縁ガラスとは硬度が大きく相違し、各部材に対する研磨速度が異なるから、上記の面を研磨で面一に加工することは容易ではない。

【0005】本発明の目的は、上記静電誘導に起因する暴発や着火薬の充填圧力による電橋線の損傷を確実に防止でき、しかも容易に製造できる電気雷管用点火部品を提供することにある。

【0006】

【課題を解決するための手段】本発明に係る一の電気雷管用点火部品は、筒部的一端部内周に内方向突出部を有する金属筒と、上記金属筒内に装着され、同金属筒の他端側に臨む端面が平坦面とされ、この端面から他端面にわたってリードピン挿通孔が貫設され、該挿通孔の挿入口に座ぐり部が設けられてなるセラミックス製絶縁体と、上記リードピン挿通孔に挿通されたピン部と上記座ぐり部に収容された膨出頭部とを有するリードピンと、上記金属筒の他端端面とリードピンの膨出頭部表面との間に接続された電橋線とを備え、上記セラミックス製絶縁体の座ぐり部底面とリードピンの膨出頭部裏面との間及び金属筒の上記内方向突出部とセラミックス製絶縁体の他端面と間がそれぞれ接合材で接合・シールされていることを特徴とする構成であり、金属筒の他端端面とセラミックス製絶縁体の平坦端面との間の段差及びセラミックス製絶縁体の平坦端面とリードピンの膨出頭部表面との間に段差が存在するも、その段差が100 $\mu$ m以下、好ましくは50 $\mu$ m以下とされている。

【0007】本発明に係る他の電気雷管用点火部品は、

筒部の片端部内周に内方向突出鉤を有する金属筒と、上記金属筒内に装着され、同金属筒の片端側に臨む端面が平坦面とされ、この平坦端面の周囲には金属筒の上記内方向突出鉤に係合された段部が設けられ、同端面から他端面にわたってリードピン挿通孔が貫設されてなるセラミックス製絶縁体と、上記リードピン挿通孔に挿通されたピン部と上記セラミックス製絶縁体の他端面に係止された鉤部とを有するリードピンと、金属筒片端側の端面とリードピンの先端端面との間に接続された電橋線とを備え、上記リードピンの鉤部とセラミックス製絶縁体の他端面との間及び金属筒の上記内方向突出鉤とセラミックス製絶縁体の上記段部との間がそれぞれ接合材で接合・シールされていることを特徴とする構成であり、金属筒の上記内方向突出鉤外面とセラミックス製絶縁体の平坦端面との間の段差及びセラミックス製絶縁体の平坦端面とリードピンの先端端面との間に段差が存在するも、その段差が100 $\mu$ m以下、好ましくは50 $\mu$ m以下とされている。

【0008】

【発明の実施の形態】以下、図面を参照しつつ本発明の実施の形態について説明する。図1は本発明に係る一の電気雷管用点火部品の一例を示す説明図である。図1において、1は金属内筒であり、筒部の一端部内周に内方向突出鉤11を有している。2はセラミックス製絶縁体であり、片端面21が平坦面とされ、この片端面21から他端面22にわたってリードピン挿通孔23が貫設され、該挿通孔23の挿入口に座ぐり部24が設けられている。3はピン部31と膨出頭部32を有するリードピンである。このリードピン3においては、ピン部31がセラミックス製絶縁体2のリードピン挿通孔23に挿通され、膨出頭部32が座ぐり部24に納められ、その膨出頭部裏面と座ぐり底面との間が接合材41、例えば、低融点金属膜により接合・シールされている。また、セラミックス製絶縁体2においては、金属内筒1内に納められ、該内筒1の内方向突出鉤11の内面とセラミックス製絶縁体2の他端面22との間が接合材42、例えば、低融点金属膜により接合・シールされている。このセラミックス製絶縁体2の片端面21と金属内筒1の片端面111との間の段差及びセラミックス製絶縁体2の片端面21とリードピン膨出頭部32の外表面321との間には段差が存在するが、その段差は100 $\mu$ m以下、好ましくは50 $\mu$ m以下とされている。

【0009】4は金属内筒1の片端面111とリードピン膨出頭部32の外表面321との間に溶接等により接続された電橋線である。5は金属内筒1の他端面に溶接された帰路側リードピンである。上記電橋線4には、通常線径が20～50 $\mu$ mの鉄、ニッケル、モリブデン、白金、タングステン、タンタル等の単体金属線、ニッケルクロム系、鉄クロムアルミニウム系等の合金線が使用される。上記金属内筒1やリードピン3には、銅、

鉄、ステンレス等が使用される。

【0010】上記において、セラミックス製絶縁体2と金属内筒1との接合・シール及びリードピン膨出頭部32とセラミックス製絶縁体2との接合・シールには、例えば、セラミックス製絶縁体の他端面及び座ぐり部にセラミックスと強固に結合した中間層（例えば、Mo-Mn法によるアルミン酸マンガン層）を形成し、この中間層上にはんだ付けが容易な銅、錫等の金属をめっきし、接合界面にシート状はんだを介在させ、両接合・シールを熱圧接により一挙に行う方法を使用できる。セラミックスがアルミナセラミックスの場合、中間層を形成せず、シート状のアルミ系はんだで熱圧接により直接に接合することもできる。この場合、金属内筒1の深さ、セラミックス製絶縁体2の高さ、セラミックス製絶縁体2の座ぐり部24の深さ、リードピン3の膨出頭部32の厚み等の加工上の公差及び金属内筒、リードピン、セラミックス製絶縁体、更には、はんだの熱膨張係数の差に基づく熱歪差に起因してセラミックス製絶縁体2の片端面21と金属内筒1の片端面111との間及び、セラミックス製絶縁体2の片端面21とリードピン先端の膨出頭部外表面321との間に段差が生じるが、通常の加工公差や上記各材料の熱膨張係数からして、この段差を100 $\mu$ m以内、好ましくは50 $\mu$ m以内に納めることは容易である。

【0011】上記の実施例においては、金属内筒1に帰路側リードピン5を溶接し、各リードピン3及び5に絶縁電線63及び65を接続しているが、図2に示すように、帰路側については、絶縁電線65を直接に金属内筒1に接続することもできる。

【0012】図3は本発明に係る他の電気雷管用点火部品の一例を示す説明図である。図3において、1は金属内筒であり、筒部の片端部内周に内方向突出鉤110を有している。2はセラミックス製絶縁体であり、片端面21が平坦面とされ、この片端面21の周囲には段部240が設けられ、同片端面21から他端面22にわたってリードピン挿通孔23が貫設されている。3はピン部31と鉤部33とを有するリードピンである。このリードピン3や金属内筒1には、上記と同様、銅や鉄等が使用される。このリードピン3においては、ピン部31がセラミックス製絶縁体2のリードピン挿通孔23に挿通され、鉤部33がセラミックス製絶縁体2の他端面22に当接され、その当接界面が接合材42、例えば、低融点金属膜により接合・シールされている。また、セラミックス製絶縁体2においては、金属内筒1内に納められ、該内筒1の内方向突出鉤110の内面とセラミックス製絶縁体2の段部240との間が接合材410、例えば、低融点金属膜により接合・シールされている。このセラミックス製絶縁体2の片端平坦面21と金属内筒1の片端面111との間の段差及び、セラミックス製絶縁体2の片端平坦面21とリードピン3の先端面311と

の間には段差が存在するも、その段差は100 $\mu$ m以下、好ましくは50 $\mu$ m以下とされている。

【0013】4は金属内筒1の片端面111とリードピン3の先端面311との間に溶接等により接続された電橋線であり、上記と同様、通常線径が20～50 $\mu$ mの鉄、ニッケル、モリブデン、白金、タングステン、タンタル等の単体金属線、ニッケルクロム系、鉄クロムアルミニウム系等の合金線が使用される5は金属内筒1の他端面に溶接された帰路側リードピンである。

【0014】上記セラミックス製絶縁体の段部と金属内筒の内方向突出部との接合・シール及びリードピンの部とセラミックス製絶縁体の他端面との接合・シールには、例えば、上記実施例と同様に接合界面におけるセラミックス製絶縁体部分に中間層を形成し、この中間層上にはんだ付けが容易な金属をめっきし、接合界面にシート状はんだ介在させ、両接合・シールを熱圧接により一挙に行う方法、中間層を設けずにシート状アルミ系はんだで両接合・シールを熱圧接により一挙に行う方法等を使用できる。この場合も、金属内筒の内方向突出部の厚み、セラミックス製絶縁体の段部の高さ、セラミックス製絶縁体の高さ、リードピンのピン部の長さ等の加工上の公差及び金属内筒、リードピン、セラミックス製絶縁体、更には、はんだの熱膨張係数の差に基づく熱歪差に起因してセラミックス製絶縁体の平坦面と金属内筒の片端面との間及び、セラミックス製絶縁体の平坦面とリードピンの先端面との間に段差が生じるが、上記と同様、この段差を100 $\mu$ m以内、好ましくは50 $\mu$ m以内に納めることは容易である。

【0015】本発明に係る点火部品は、金属外筒の開口に当該点火部品の金属内筒において気密に被冠すると共に金属外筒内に着火薬を充填することにより使用される。この場合、金属外筒とリードピン3及び5との間が金属内筒1並びに電橋線4等により電氣的に低抵抗にて連結されるので、静電誘導に起因する暴発を排除できる。また、電橋線においては着火薬の充填圧力で加圧されるが、電橋線が圧接されるセラミックス製絶縁体の端面が平坦であり、この平坦面とリードピンの先端端面との段差及び同平坦面と金属内筒片端面との段差が100 $\mu$ m以下、好ましくは50 $\mu$ m以下（電橋線外径にほぼ等しい寸法以下）にされているので、電橋線を段差箇所

及びリードピン先端部とセラミックス製絶縁体との接合・シールにより、着火薬が外部に対し気密に保持されているから、着火薬を湿化や変質を排除して安定に保持できる。従って、確実な作動、優れた信頼性を保証できる。本発明に係る点火部品は、電橋線が接する面の段差を、金属内筒、セラミックス製絶縁体、リードピン等の各部材の通常の加工公差からして100 $\mu$ m以下好ましくは50 $\mu$ m以下に抑え得る構成であり、製作も容易である。

【0016】

【発明の効果】本発明に係る電気雷管用点火部品においては、構造上、電橋線が接する面に段差が生じる構成であっても、部材の通常の加工公差でその段差を100 $\mu$ m以下、好ましくは50 $\mu$ m以下に容易に抑え得る構成である。従って、本発明によれば、電橋線が着火薬の充填圧力で損傷する恐れのない製造容易な電気雷管用点火部品を提供できる。

【図面の簡単な説明】

【図1】請求項1に係る電気雷管用点火部品の一例を示す説明図である。

【図2】請求項1に係る電気雷管用点火部品の他の例を示す説明図である。

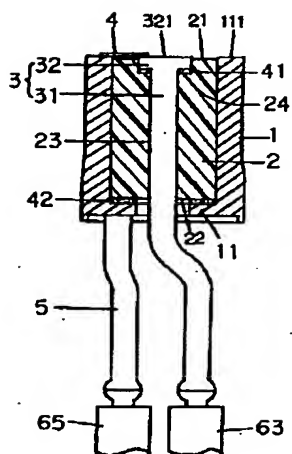
【図3】請求項2に係る電気雷管用点火部品の一例を示す説明図である。

【図4】従来例を示す説明図である。

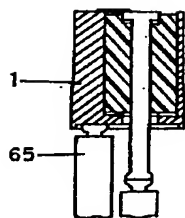
【符号の説明】

1	金属内筒
11	内方向突出部
110	内方向突出部
2	セラミックス絶縁体
21	平坦面
24	座ぐり部
240	段部
3	リードピン
31	ピン部
32	膨出頭部
33	部
41	接合材
42	接合材
410	接合材
4	電橋線

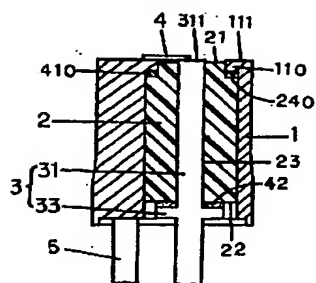
【図1】



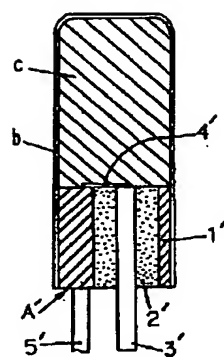
【図2】



【図3】



【図4】



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